

TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
Cover Sheet	.....	i
Readers Guide	.....	iii
Foreword	.....	FD-1
Acronyms and Abbreviations	.....	AA-1
1.0 Purpose & Need for Agency Action	.....	1-1
1.1 Purpose and Need for Agency Action .....	.....	1-1
1.2 Timing and Regulatory Considerations Important and Relevant to Purpose and Need .....	.....	1-3
1.3 Proposed Action.....	.....	1-5
1.4 Role of this EIS in the Decision-Making Process.....	.....	1-5
1.5 Organization of the EIS .....	.....	1-5
2.0 Background	.....	2-1
2.1 INEEL Overview .....	.....	2-2
2.1.1 Site Description.....	.....	2-2
2.1.2 Organization and Administration .....	.....	2-2
2.1.3 Current Mission.....	.....	2-4
2.2 High-Level Waste Overview .....	.....	2-10
2.2.1 High-Level Waste Description.....	.....	2-10
2.2.2 High-Level Waste Management at INEEL .....	.....	2-10
2.2.3 Technology Development .....	.....	2-12
2.2.4 High-Level Waste Management in a National Context .....	.....	2-16
2.2.5 Legal Requirements for High-Level Waste Management....	.....	2-21
2.3 EIS Scope and Overview .....	.....	2-26
2.3.1 Other Related NEPA and CERCLA Reviews .....	.....	2-28
2.3.2 Other Actions .....	.....	2-31
2.3.3 Scoping Process .....	.....	2-31
2.3.4 Public Comment Process on the Draft Environmental Impact Statement.....	.....	2-33
2.3.5 Other Information and Technologies Reviewed .....	.....	2-34
3.0 Alternatives	.....	3-1
3.1 Waste Processing Alternatives.....	.....	3-3
3.1.1 No Action Alternative .....	.....	3-3
3.1.2 Continued Current Operations Alternative .....	.....	3-13
3.1.3 Separations Alternative .....	.....	3-13
3.1.3.1 Full Separations Option.....	.....	3-15
3.1.3.2 Planning Basis Option.....	.....	3-17
3.1.3.3 Transuranic Separations Option .....	.....	3-18
3.1.4 Non-Separations Alternative .....	.....	3-18
3.1.4.1 Hot Isostatic Pressed Waste Option .....	.....	3-21

TABLE OF CONTENTS

(continued)

<u>Section</u>		<u>Page</u>
	3.1.4.2 Direct Cement Waste Option	3-22
	3.1.4.3 Early Vitrification Option	3-22
	3.1.4.4 Steam Reforming Option	3-25
3.1.5	Minimum INEEL Processing Alternative	3-25
3.1.6	Direct Vitrification Alternative	3-29
	3.1.6.1 Mixed Transuranic Waste/SBW Treatment	3-29
	3.1.6.2 Calcine Treatment	3-33
	3.1.6.3 Newly Generated Liquid Waste Treatment.....	3-33
3.2	Facility Disposition Alternatives	3-34
	3.2.1 Description of Facility Disposition Alternatives.....	3-35
	3.2.2 Process for Identifying Current Facilities to be Analyzed ...	3-38
3.3	Alternatives Eliminated from Detailed Analysis	3-39
	3.3.1 Transuranic Separations/Class A Type Grout Option.....	3-40
	3.3.2 Non-Separations/Vitrified Waste Option	3-40
	3.3.3 Non-Separations/Cement-Ceramic Waste Option	3-41
	3.3.4 Disposal of Low-Level Waste Class A or Class C Type Grout at the Hanford Site	3-42
	3.3.5 Vitrification at the West Valley Demonstration Project or the Savannah River Site.....	3-42
	3.3.6 Shipment of Mixed Transuranic Waste (SBW/Newly Generated Liquid Waste) to the Hanford Site for Treatment	3-42
	3.3.7 Treatment of Mixed Transuranic Waste/SBW at the Advanced Mixed Waste Treatment Project	3-43
	3.3.8 Grout-In-Place.....	3-44
	3.3.9 Other Technologies Evaluated	3-45
3.4	Preferred Alternatives	3-45
	3.4.1 Waste Processing	3-45
	3.4.2 Facilities Disposition.....	3-46
3.5	Summary Level Comparison of Impacts	3-47
4.0	Affected Environment.....	4-1
4.1	Introduction.....	4-1
4.2	Land Use	4-2
	4.2.1 Existing and Planned Land Uses at INEEL	4-2
	4.2.2 Existing and Planned Land Use in the Surrounding Region	4-3
4.3	Socioeconomics	4-4
	4.3.1 Population and Housing	4-4
	4.3.1.1 Population	4-4

TABLE OF CONTENTS

(continued)

<u>Section</u>		<u>Page</u>
	4.3.1.2 Housing	4-5
4.3.2	Employment and Income	4-5
4.3.3	Community Services	4-8
4.3.4	Public Finance	4-8
4.4	Cultural Resources	4-9
4.4.1	Cultural Resource Management and Consultation at INEEL	4-9
4.4.2	Current Status of Cultural Resource Inventories at INEEL	4-9
4.4.3	Paleontological Resources	4-10
4.4.4	Prehistoric Resources	4-10
4.4.4.1	Archaeological Record	4-10
4.4.4.2	Early Native American Cultures	4-11
4.4.5	Historic Resources	4-11
4.4.6	Native American and Euroamerican Interactions	4-15
4.4.7	Contemporary Cultural Practices and Resource Management	4-17
4.5	Aesthetic and Scenic Resources	4-18
4.5.1	Visual Character of INEEL	4-18
4.5.2	Scenic Areas	4-19
4.6	Geology and Soils	4-20
4.6.1	General Geology	4-20
4.6.2	Natural Resources	4-23
4.6.3	Seismic Hazards	4-23
4.6.4	Volcanic Hazards	4-24
4.7	Air Resources	4-25
4.7.1	Climate and Meteorology	4-25
4.7.2	Standards and Regulations	4-27
4.7.3	Radiological Air Quality	4-27
4.7.3.1	Sources of Radioactivity	4-27
4.7.3.2	Existing Radiological Conditions	4-28
4.7.3.3	Summary of Radiological Conditions	4-32
4.7.4	Nonradiological Conditions	4-33
4.7.4.1	Sources of Air Emissions	4-33
4.7.4.2	Existing Conditions	4-34
4.7.4.3	Summary of Nonradiological Air Quality	4-39
4.8	Water Resources	4-40
4.8.1	Surface Water	4-40
4.8.1.1	Regional Drainage	4-40

TABLE OF CONTENTS

(continued)

<u>Section</u>		<u>Page</u>
	4.8.1.2 Local Drainage.....	4-40
	4.8.1.3 Flood Plains.....	4-42
	4.8.1.4 Surface Water Quality.....	4-44
4.8.2	Subsurface Water	4-47
	4.8.2.1 Regional Hydrogeology	4-47
	4.8.2.2 Local Hydrogeology.....	4-47
	4.8.2.3 Vadose Zone Hydrology	4-49
	4.8.2.4 Perched Water	4-49
	4.8.2.5 Subsurface Water Quality	4-49
4.9	Ecological Resources	4-54
	4.9.1 Plant Communities and Associations	4-58
	4.9.2 Wildlife	4-62
	4.9.3 Threatened, Endangered, and Sensitive Species	4-62
	4.9.4 Wetlands (or Wetland-Like Areas)	4-62
	4.9.5 Radioecology.....	4-62
4.10	Traffic and Transportation	4-64
	4.10.1 Roadways	4-64
	4.10.1.1 Infrastructure – Regional and Site Systems	4-64
	4.10.1.2 Infrastructure – Idaho Falls	4-66
	4.10.1.3 Transit Modes.....	4-66
	4.10.2 Railroads	4-66
	4.10.3 Air Traffic	4-66
	4.10.4 Accidents.....	4-66
	4.10.5 Transportation of Waste and Materials	4-67
	4.10.6 Transportation Noise	4-69
4.11	Health and Safety	4-71
	4.11.1 Public Health and Safety	4-71
	4.11.1.1 Radiological Health Risk	4-71
	4.11.1.2 Nonradiological Health Risk.....	4-72
	4.11.2 Occupational Health and Safety.....	4-73
	4.11.2.1 Radiological Exposure and Health Effects.....	4-74
	4.11.2.2 Nonradiological Exposure and Health Effects to the Onsite Population	4-74
4.12	Environmental Justice	4-75
	4.12.1 Community Characteristics	4-75
	4.12.2 Distribution of Minority and Low-Income Populations.....	4-78
4.13	Utilities and Energy	4-78
	4.13.1 Water Consumption	4-79
	4.13.2 Electricity Consumption.....	4-79

TABLE OF CONTENTS

(continued)

<u>Section</u>		<u>Page</u>
	4.13.3 Fuel Consumption	4-79
	4.13.4 Wastewater Disposal	4-79
4.14	Waste Management.....	4-80
	4.14.1 Industrial Solid Waste	4-80
	4.14.2 Hazardous Waste.....	4-81
	4.14.3 Mixed Low-Level Waste.....	4-81
	4.14.4 Low-Level Waste	4-81
	4.14.5 Transuranic Waste.....	4-81
	4.14.6 High-Level Waste	4-82
5.0	Environmental Consequences.....	5-1
5.1	Introduction.....	5-1
5.2	Waste Processing Impacts	5-3
	5.2.1 Land Use	5-4
	5.2.1.1 No Action	5-6
	5.2.1.2 Continued Current Operations Alternative.....	5-6
	5.2.1.3 Separations Alternative	5-6
	5.2.1.4 Non-Separations Alternative	5-7
	5.2.1.5 Minimum INEEL Processing Alternative	5-7
	5.2.1.6 Preferred Alternative	5-7
	5.2.2 Socioeconomics.....	5-8
	5.2.2.1 Methodology	5-8
	5.2.2.2 Construction Impacts.....	5-10
	5.2.2.3 Operational Impacts	5-12
	5.2.3 Cultural Resources	5-14
	5.2.3.1 Construction Impacts.....	5-14
	5.2.3.2 Operational Impacts	5-15
	5.2.4 Aesthetic and Scenic Resources.....	5-17
	5.2.4.1 Methodology	5-17
	5.2.4.2 Construction Impacts.....	5-18
	5.2.4.3 Operational Impacts	5-19
	5.2.5 Geology and Soils	5-20
	5.2.5.1 No Action	5-20
	5.2.5.2 Continued Current Operations Alternative.....	5-20
	5.2.5.3 Separations Alternative	5-21
	5.2.5.4 Non-Separations Alternative	5-21
	5.2.5.5 Minimum INEEL Processing Alternative	5-21
	5.2.5.6 Direct Vitrification Alternative	5-21
	5.2.6 Air Resources	5-22
	5.2.6.1 Methodology	5-22
	5.2.6.2 Construction Emissions and Impacts	5-23
	5.2.6.3 Radionuclide Emissions and Impacts from Operations	5-25

TABLE OF CONTENTS

(continued)

<u>Section</u>		<u>Page</u>
	5.2.6.4 Nonradiological Emissions and Impacts from Operations	5-29
	5.2.6.5 Prevention of Significant Deterioration Increment Consumption	5-37
	5.2.6.6 Other Air-Quality-Related Values	5-40
	5.2.6.7 Air Resources Impacts from Alternatives Due to Mobile Sources	5-43
5.2.7	Water Resources.....	5-44
	5.2.7.1 Methodology	5-44
	5.2.7.2 Construction Impacts.....	5-45
	5.2.7.3 Operational Impacts	5-45
5.2.8	Ecological Resources	5-46
	5.2.8.1 Methodology	5-46
	5.2.8.2 Construction Impacts.....	5-47
	5.2.8.3 Operational Impacts	5-47
5.2.9	Traffic and Transportation	5-51
	5.2.9.1 Methodology	5-53
	5.2.9.2 Construction Impacts.....	5-57
	5.2.9.3 Operational Impacts	5-57
	5.2.9.4 Traffic Noise	5-60
5.2.10	Health and Safety	5-73
	5.2.10.1 Methodology	5-73
	5.2.10.2 Radiological and Nonradiological Construction Impacts.....	5-74
	5.2.10.3 Radiological and Nonradiological Operational Impacts	5-74
	5.2.10.4 Occupational Safety Impacts.....	5-81
5.2.11	Environmental Justice	5-84
	5.2.11.1 Methodology	5-84
	5.2.11.2 Construction Impacts.....	5-86
	5.2.11.3 Operational Impacts	5-86
	5.2.11.4 Subsistence Consumption of Fish, Wildlife, and Game	5-87
5.2.12	Utilities and Energy.....	5-88
	5.2.12.1 Construction Impacts.....	5-88
	5.2.12.2 Operational Impacts	5-88
5.2.13	Waste and Materials.....	5-93
	5.2.13.1 Methodology	5-93

TABLE OF CONTENTS

(continued)

<u>Section</u>		<u>Page</u>
5.2.13.2 Construction Impacts.....	5-94	
5.2.13.3 Operational Impacts	5-94	
5.2.13.4 Impacts to Facilities that Would Receive Waste from the Waste Processing Alternatives	5-98	
5.2.14 Facility Accidents.....	5-106	
5.2.14.1 Methodology for Analysis of Accident Risk to Noninvolved Workers and the Public	5-107	
5.2.14.2 Methodology for Integrated Analysis of Risk to Involved Workers	5-114	
5.2.14.3 Bounding Radiological Impacts to Noninvolved Workers and the Public of Implementing the Alternatives	5-115	
5.2.14.4 Anticipated Radiological Risks of Bounding Facility Accidents.....	5-115	
5.2.14.5 Impacts of Chemical Release Accidents on Noninvolved Workers and the Public of Implementing the Alternatives	5-118	
5.2.14.6 Groundwater Impacts to the Public of Implementing the Alternatives	5-118	
5.2.14.7 Consideration of Other Accident Initiators	5-122	
5.2.14.8 Sensitivity Analysis.....	5-123	
5.2.14.9 Risk to Involved Worker	5-123	
5.3 Facility Disposition Impacts	5-125	
5.3.1 Land Use	5-126	
5.3.2 Socioeconomics.....	5-127	
5.3.2.1 Proposed New Facilities Associated with Waste Processing Alternatives	5-127	
5.3.2.2 Existing Facilities Associated with High-Level Waste Management	5-127	
5.3.3 Geology and Soils	5-134	
5.3.4 Air Resources	5-135	
5.3.4.1 Proposed New Facilities Associated with Waste Processing Alternatives	5-135	
5.3.4.2 Existing Facilities Associated with High-Level Waste Management	5-145	
5.3.5 Water Resources.....	5-160	
5.3.5.1 Short-Term Impacts.....	5-160	
5.3.5.2 Long-Term Impacts.....	5-161	
5.3.6 Ecological Resources	5-161	
5.3.6.1 Short-Term Impacts.....	5-164	
5.3.6.2 Long-Term Impacts.....	5-165	

TABLE OF CONTENTS

(continued)

<u>Section</u>		<u>Page</u>
5.3.7	Traffic and Transportation	5-165
5.3.7.1	Methodology for Traffic Impact Analysis.....	5-165
5.3.7.2	Traffic Impacts	5-165
5.3.8	Health and Safety	5-166
5.3.8.1	Short-Term Impacts.....	5-166
5.3.8.2	Long-Term Impacts.....	5-180
5.3.9	Environmental Justice	5-181
5.3.9.1	Methodology	5-183
5.3.9.2	Facility Disposition Impacts.....	5-183
5.3.10	Utilities and Energy.....	5-184
5.3.11	Waste and Materials.....	5-184
5.3.12	Facility Disposition Accidents	5-199
5.3.12.1	Introduction	5-199
5.3.12.2	Facility Disposition Alternatives.....	5-203
5.3.12.3	Analysis Methodology for Noninvolved Workers and the Offsite Public	5-203
5.3.12.4	Facility Disposition Accident Summary for Noninvolved Workers and the Offsite Public	5-209
5.3.12.5	Impact of Facility Disposition Accidents on Involved Workers	5-209
5.4	Cumulative Impacts	5-211
5.4.1	Methodology	5-211
5.4.2	Identification of Past, Present, and Reasonably Foreseeable Actions	5-212
5.4.3	Resource and Pathways Included in the Cumulative Impact Analysis.....	5-214
5.4.3.1	Land Based Impacts Including Ecology, Cultural Resources, and Geology and Soils	5-214
5.4.3.2	Socioeconomics.....	5-220
5.4.3.3	Air Resources	5-220
5.4.3.4	Water Resources.....	5-221
5.4.3.5	Traffic and Transportation	5-222
5.4.3.6	Health and Safety	5-225
5.4.3.7	Waste Management	5-228
5.5	Mitigation Measures	5-232
5.6	Unavoidable Adverse Environmental Impacts	5-232

TABLE OF CONTENTS

(continued)

<u>Section</u>		<u>Page</u>
5.6.1	Cultural Resources	5-232
5.6.2	Aesthetic and Scenic Resources.....	5-232
5.6.3	Air Resources.....	5-233
5.6.4	Water Resources.....	5-233
5.6.5	Ecological Resources	5-233
5.6.6	Health and Safety	5-233
5.7	Short-term Use Versus Long-term Productivity of the Environment.....	5-234
5.7.1	No Action Alternative	5-234
5.7.2	Continued Current Operations Alternative	5-234
5.7.3	Action Alternative	5-234
5.8	Irreversible and Irretrievable Commitments of Resources	5-234
6.0	Statutes, Regulations, Consultations, and Other Requirements	
6.1	Consultations and Coordination.....	6-2
6.2	Pertinent Federal and State Statutes, Regulations, and Restrictions...	6-4
6.2.1	Planning and Consultation Requirements	6-4
6.2.2	Radioactive Materials and Repositories	6-9
6.2.3	Air Quality Protection and Noise	6-11
6.2.4	Water Quality Protection.....	6-14
6.2.5	Control of Pollution.....	6-16
6.2.6	Overview of Regulatory Compliance at INTEC	6-21
6.3	Compliance of Alternatives with Regulatory Requirements	6-23
6.3.1	Permits, Licenses, and/or Approvals Required for Each Alternative.....	6-23
6.3.2	Issues and Implications of Regulatory Requirements	6-23
6.3.2.1	Delisting	6-23
6.3.2.2	Waste Incidental to Reprocessing	6-27
6.3.2.3	Hazardous Waste Codes Applicable to INEEL's HLW & SBW	6-29
6.3.2.4	Repository Capacity and Waste Acceptance Criteria.....	6-30
6.3.2.5	Cumulative Risk to the Groundwater.....	6-31
6.3.2.6	RCRA Closure	6-32
6.3.2.7	RCRA/CERCLA Interface	6-32
6.3.2.8	Maximum Achievable Control Technology Standards for Hazardous Waste Combustion....	6-33
6.3.2.9	Compliance with Existing Agreements	6-33

TABLE OF CONTENTS (continued)

<u>Section</u>		<u>Page</u>
6.3.3	Additional Waste Processing Alternative Specific Issues.... 6.3.3.1 No Action Alternative 6.3.3.2 Continued Current Operations Alternative..... 6.3.3.3 Separations Alternative 6.3.3.4 Non-Separations Alternative 6.3.3.5 Minimum INEEL Processing Alternative 6.3.3.6 Direct Vitrification Alternative – State of Idaho's Preferred Alternative	6-33 6-33 6-33 6-35 6-35 6-36 6-36
6.3.4	Additional Facility Disposition Alternatives Specific Issues	6-37
7.0	Glossary	7-1
8.0	Contents of Appendices.....	8-1
9.0	References	9-1
10.0	Preparers, Contributors, and Reviewers.....	10-1
10.1	Preparers and Contributors	10-1
10.2	Reviewers	10-13
11.0	Response to Public Comments	11-1
11.1	Introduction.....	11-1
11.2	Opportunities for Public Comment and Response Format	11-2
11.2.1	Changes to the EIS Resulting from Public Comments and Agency Review	11-2
11.2.2	How to Locate Responses to Comments.....	11-3
11.2.3	How to Find Reference Documents	11-3
11.3	Summary Comments and DOE Responses.....	11-16
12.0	Distribution List.....	12-1
12.1	United States Congress	12-2
12.1.1	United States Senators from Idaho.....	12-2
12.1.2	United States Senators from Other States	12-2
12.1.3	United States Senate Committees	12-2
12.1.4	United States Representatives from Idaho	12-3
12.1.5	United States Representatives from Other States.....	12-3
12.1.6	United States House of Representatives Committees	12-4
12.2	Federal Agencies.....	12-5
12.3	State of Idaho	12-6
12.3.1	Statewide Offices and Legislature.....	12-6
12.3.2	State and Local Agencies and Officials	12-7
12.4	Other States.....	12-8
12.4.1	Governors	12-8

TABLE OF CONTENTS

(continued)

<u>Section</u>		<u>Page</u>
	12.4.2 Other Officials.....	12-8
12.5	Native American Tribes and Organizations.....	12-9
12.6	Environmental and Public Interest Groups.....	12-10
	12.6.1 National.....	12-10
	12.6.2 Regional, State, and Local	12-11
12.7	Other Groups and Individuals.....	12-12
12.8	State Contacts for National Environmental Policy Act Documentation.....	12-20
12.9	Information Locations.....	12-20
13.0	Index.....	13-1
Appendix A	Site Evaluation Process	A-1
Appendix B	Waste Processing Alternative Selection Process.....	B-1
Appendix C.1	Socioeconomics.....	C.1-1
Appendix C.2	Air Resources.....	C.2-1
Appendix C.3	Health and Safety	C.3-1
Appendix C.4	Facility Accidents	C.4-1
Appendix C.5	Traffic and Transportation.....	C.5-1
Appendix C.6	Project Information	C.6-1
Appendix C.7	Description of Input and Final Waste Steams	C.7-1
Appendix C.8	Description of Activities and Impacts at the Hanford Site	C.8-1
Appendix C.9	Facility Disposition Modeling	C.9-1
Appendix C.10	Environmental Consequences Data	C.10-1
Appendix D	Comment Documents on Draft EIS	D-1

LIST OF TABLES

<u>Table</u>		<u>Page</u>
2-1	Agreements between DOE and the State of Idaho for operations at INTEC	2-22
3-1	Major INTEC facilities or activities required for each waste processing alternative.....	3-4
3-2	Summary of key attributes of the waste processing alternatives	3-7
3-3	Facility disposition alternatives analyzed in this EIS	3-36
3-4	Summary comparison of impacts on resources from waste processing alternatives.....	3-51
3-5	Summary comparison of impacts on resources from facility disposition....	3-65
4-1	Population of the INEEL region of influence and Idaho: selected years 1980-2025	4-4
4-2	Region of influence housing characteristics (2000)	4-6
4-3	Historical trends in region of influence labor force.....	4-6
4-4	Historical trends in region of influence employment	4-6
4-5	Historical trends in region of influence unemployment rates	4-7
4-6	INEEL tax support to southeastern Idaho counties (in millions of dollars).....	4-8
4-7	INTEC buildings and structures potentially eligible for listing in the National Register of Historic Places.....	4-16
4-8	Estimated activity of radionuclide and mass of non-radionuclide contaminants of concern in soils at INTEC	4-24
4-9	Summary of airborne radionuclide emissions (in curies) for 1995 and 1996 from facility areas at INEEL.....	4-29
4-10	Summary of airborne radionuclide emissions (in curies) for 1999 and 2000 from facility areas at INEEL.....	4-30
4-11	Comparison of recent criteria air pollutant emissions estimates for INEEL with the levels assessed under the maximum emissions case in the SNF & INEL EIS	4-34
4-12	Ambient air concentrations of criteria pollutants from the combined effects of maximum baseline emissions and projected increases.....	4-36
4-13	Prevention of Significant Deterioration increment consumption at distant Class I areas by sources subject to Prevention of Significant Deterioration regulation	4-37
4-14	Prevention of Significant Deterioration increment consumption at the Craters of the Moon Class I area by sources subject to Prevention of Significant Deterioration regulation	4-38
4-15	Prevention of Significant Deterioration increment consumption at Class II areas at Idaho National Engineering and Environmental Laboratory by sources subject to Prevention of Significant Deterioration regulation	4-38

LIST OF TABLES

(continued)

<u>Table</u>		<u>Page</u>
4-16	Criteria pollutant ambient air quality standards and baseline used to assess cumulative impacts at public access locations	4-39
4-17	Monitoring parameters that were exceeded for INTEC surveillance wells.....	4-51
4-18	Maximum concentrations of inorganics and radionuclides in perched water at INTEC.....	4-52
4-19	Maximum concentrations of inorganics and radionuclides in the Snake River Plain Aquifer in the vicinity of INTEC	4-53
4-20	Trends in tritium, strontium-90, and iodine-129 in selected wells at the INEEL.....	4-58
4-21	Listed Threatened and Endangered Species, Species of Concern, and other unique species that occur, or possibly occur, on Idaho National Engineering and Environmental Laboratory	4-63
4-22	Baseline traffic for selected highway segments in the vicinity of the Idaho National Engineering and Environmental Laboratory	4-64
4-23	Baseline annual vehicle miles traveled for traffic related to the Idaho National Engineering and Environmental Laboratory	4-66
4-24	Highway combination-truck accident, injury, and fatality rates for Idaho ...	4-67
4-25	Annual average shipments to and from the Idaho National Engineering and Environmental Laboratory (1998-2001)	4-67
4-26	Estimated annual doses and fatalities from onsite incident-free shipments at the Idaho National Engineering and Environmental Laboratory	4-68
4-27	Annual dose to individuals from exposure to routine airborne releases at the Idaho National Engineering and Environmental Laboratory	4-72
4-28	Estimated increased health effects due to routine airborne releases at the Idaho National Engineering and Environmental Laboratory	4-72
4-29	U.S. Census poverty thresholds in 1989 by size of family and number of related children under 18 years.....	4-78
4-30	Summary of waste volumes awaiting treatment and disposal at INEEL.....	4-81
5.2-1	New facilities and land requirements by waste processing alternative.....	5-5
5.2-2	Construction phase employment and income by alternative during respective peak year.....	5-11
5.2-3	Population and labor projections	5-12
5.2-4	Operations phase employment and income by alternative during respective peak year.....	5-13
5.2-5	Bureau of Land Management Visual Resource Management objectives	5-19
5.2-6	Total and annualized construction-related criteria air pollutant emissions and fugitive dust generation for waste processing alternatives	5-24
5.2-7	Radionuclide emission rates (curies per year) for waste processing alternatives.....	5-26
5.2-8	Projected nonradiological pollutant emission rates (tons per year) for the proposed waste processing alternatives	5-30

LIST OF TABLES

(continued)

<u>Table</u>	<u>Page</u>
5.2-9 Prevention of Significant Deterioration Increment consumption for the combined effects of baseline sources, waste processing alternatives, and other planned future projects	5-39
5.2-10 Prevention increment consumption at Class I Areas beyond 50 kilometers from INTEC for the combined effects of baseline sources and the Planning Basis Option	5-40
5.2-11 Maximum concentrations of contaminants in soils outside of INTEC compared to per ecologically based screening levels (in milligrams per kilogram)	5-50
5.2-12 Maximum concentrations of radionuclides in soils outside of INTEC compared to background and ecologically-based screening levels (in picocuries per gram).....	5-52
5.2-13 Estimated fatalities from truck emissions and accidents (vehicle-related impacts)	5-59
5.2-14 Estimated fatalities from rail accidents (vehicle-related impacts).....	5-61
5.2-15 Estimated cargo-related incident-free transportation impacts – truck	5-63
5.2-16 Estimated cargo-related incident-free transportation impacts – rail	5-66
5.2-17 Cargo-related impacts from truck transportation accidents	5-69
5.2-18 Cargo-related impacts from rail transportation accidents.....	5-71
5.2-19 Estimated radiological impacts to involved workers by alternative during construction activities	5-75
5.2-20 Estimated public and occupational radiological impacts from atmospheric emissions	5-76
5.2-21 Estimated radiological impacts to involved workers by alternative during facility operations	5-79
5.2-22 Estimated radiological impacts to involved workers from interim storage operations post-2035.....	5-80
5.2-23 Projected noncarcinogenic toxic pollutant maximum concentrations at the site boundary for the proposed waste processing alternatives	5-80
5.2-24 Projected carcinogenic toxic pollutant maximum concentrations at the site boundary for the proposed waste processing alternatives	5-81
5.2-25 Estimated worker injury impacts during construction at INEEL by alternative (peak year and total cases)	5-82
5.2-26 Estimated worker injury impacts at INEEL by alternative during operations (peak year and total cases)	5-83
5.2-27 Estimated annual worker injury impacts to involved workers from interim storage operations post-2035	5-85
5.2-28 Utility and energy requirements for construction by waste processing alternative	5-89
5.2-29 Utility and energy requirements for operations by waste processing alternative	5-91

LIST OF TABLES

(continued)

<u>Table</u>		<u>Page</u>
5.2-30 Annual utility and energy requirements from interim storage operations after the year 2035	5-92	
5.2-31 Annual average and total process waste volumes (cubic meters) generated during construction.....	5-95	
5.2-32 Peak annual process waste volumes (cubic meters) generated during construction and the year(s) they would occur	5-96	
5.2-33 Annual average and total process waste volumes (cubic meters) generated during operations through the year 2035	5-97	
5.2-34 Peak annual waste volumes (cubic meters) generated during storage operations and the year(s) they would occur	5-99	
5.2-35 Annual production of process waste (cubic meters) from storage operations after the year 2035	5-100	
5.2-36 Total volumes (cubic meters) of product waste that would result from the alternatives.....	5-101	
5.2-37 Summary of key material quantities (cubic meters) that would be committed to each of the alternative processes	5-102	
5.2-38 DOE facility accident frequency categories	5-108	
5.2-39 Accident evaluations required	5-110	
5.2-40 Anticipated risk for bounding radiological events for the various waste processing alternatives.....	5-116	
5.2-41 Summary of bounding chemical events for the various waste processing alternatives.....	5-119	
5.2-42 Groundwater impacts due to accidents	5-120	
5.2-43 Point estimates of integrated involved worker risk for the processing alternatives.....	5-124	
5.3-1 Summary of employment and income from disposition of facilities that would be constructed under the waste processing alternatives.....	5-128	
5.3-2 Summary of annual employment and income for disposition of the Tank Farm and bin sets by facility disposition alternative	5-133	
5.3-3 Summary of annual employment and income for disposition of existing HLW management facility groups.....	5-133	
5.3-4 Summary of annual and cumulative emissions from disposition of facilities that would be constructed under the waste processing alternatives.....	5-136	
5.3-5 Comparison of criteria pollutant emission rates (tons/year) for disposition of facilities associated with the waste processing alternatives.....	5-137	
5.3-6 Summary of annual and cumulative emissions from disposition of the Tank Farm and bin sets under alternative closure scenarios	5-146	

LIST OF TABLES

(continued)

<u>Table</u>		<u>Page</u>
5.3-7	Summary of maximum annual and cumulative emissions from decontaminating and decommissioning other existing facilities associated with HLW management.....	5-147
5.3-8	Projected long-term peak groundwater concentrations for contaminants associated with the facility disposition scenarios	5-162
5.3-9	Estimated radiological impacts to involved workers during disposition activities for new facilities.....	5-167
5.3-10	Summary of radiation dose impacts associated with airborne radionuclide emissions from disposition of facilities associated with waste processing alternatives.....	5-171
5.3-11	Estimated worker injury impacts during disposition activities of new facilities at INEEL by alternative	5-172
5.3-12	Estimated radiological health impacts from disposition activities for existing facilities (annual and total dose).....	5-177
5.3-13	Summary of radiation dose impacts associated with airborne radionuclide emissions from disposition of the Tank Farm and bin sets under alternative closure scenarios.....	5-177
5.3-14	Summary of radiation dose impacts associated with airborne radionuclide emission from disposition of other existing facilities associated with HLW management.....	5-178
5.3-15	Estimated worker injury impacts from disposition activities for existing facilities	5-179
5.3-16	Lifetime radiation dose (millirem) receptor and facility disposition scenario.....	5-181
5.3-17	Noncarcinogenic health hazard quotients	5-182
5.3-18	Utility and energy requirements for disposition of new facilities	5-185
5.3-19	Summary of annual resource impacts from disposition of existing facilities with multiple disposition alternatives.....	5-191
5.3-20	Summary of resource impacts from disposition of other existing facilities associated with HLW management	5-192
5.3-21	Summary of waste generated from the disposition of new waste processing facilities	5-193
5.3-22	Waste generated for existing HLW management facilities by facility and disposition alternative	5-198
5.3-23	Existing INTEC facilities with significant risk of accident impacts to noninvolved workers and to the offsite public	5-203
5.3-24	Summary of facility disposition accidents potentially impacting noninvolved workers or the offsite public	5-205
5.3-25	Industrial hazards impacts during disposition of existing HLW management facility groups using “average DOE-private industry incident rates (per 200,000 hours)”	5-210

LIST OF TABLES

(continued)

<u>Table</u>	<u>Page</u>
5.4-1 Projects included in the environmental baseline for analyses of cumulative impacts	5-212
5.4-2 Onsite actions included in the assessment of cumulative impacts.....	5-213
5.4-3 Waste processing impacts from each Idaho HLW & FD EIS alternative.....	5-216
5.4-4 Maximum impact from Idaho HLW & FD EIS alternatives and other past, present, and reasonably foreseeable projects evaluated in this EIS. (Health & Safety and Transportation impacts are addressed in applicable sections).....	5-218
5.4-5 List of INTEC facilities subject to closure and anticipated closure action and time of closure activity	5-219
5.4-6 Summary of radiation dose impacts associated with airborne radionuclide emissions	5-221
5.4-7 Comparison of recent criteria pollutant emissions estimates with the levels assessed under the maximum emissions case in the SNF & INEL EIS.....	5-221
5.4-8 Cumulative transportation-related radiological collective doses and cancer fatalities	5-223
5.4-9 Comparison of groundwater impacts.....	5-228
6-1 Draft EIS public involvement activities	6-5
6-2 Examples of facilities that may require permits, licenses, and/or approvals	6-24
6-3 Air, water, NRC, DOT, and RCRA permits, licenses, or approvals required for each alternative	6-25
6-4 Facility-specific list of permits, licenses, and approvals that may be required.....	6-26
6-5 Compliance status of the proposed alternatives with the INEEL HLW enforceable milestones	6-34
11-1 Summary Comments and DOE Responses.....	11-4
11-2 Index – Alphabetical List of Commentors by Name	11-6

LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
2-1	Idaho National Engineering and Environmental Laboratory vicinity map...	2-3
2-2	Major facility areas located at the Idaho National Engineering and Environmental Laboratory.....	2-5
2-3	Selected land use within a 50-mile radius of the Idaho National Engineering and Environmental Laboratory	2-6
2-4	Current INTEC high-level waste system simplified flow diagram	2-11
2-5	The Calcined Solids Storage Facilities at INTEC (bin sets).....	2-13
2-6	Tank heel removal and stabilization	2-15
3-1	No Action Alternative	3-11
3-2	Continued Current Operations Alternative.....	3-14
3-3	Full Separations Option	3-16
3-4	Planning Basis Option	3-19
3-5	Transuranic Separations Option	3-20
3-6	Hot Isostatic Pressed Waste Option.....	3-23
3-7	Direct Cement Waste Option.....	3-24
3-8	Early Vitrification Option.....	3-26
3-9	Steam Reforming Option.....	3-27
3-10	Minimum INEEL Processing Alternative	3-30
3-11	Vitrification without Calcine Separations Option	3-31
3-12	Vitrification with Calcine Separations Option	3-32
3-13	Timelines	3-49
4-1	1995 employment by sector.....	4-7
4-2	Plants used by the Shoshone-Bannock located on or near INEEL	4-12
4-3	Historic trails and roads of Idaho National Engineering and Environmental Laboratory	4-14
4-4	Map of the Idaho National Engineering and Environmental Laboratory showing locations of volcanic rift zones	4-21
4-5	Lithologic logs of deep drill holes on INEEL	4-22
4-6	Annual average wind direction and speed at meteorological monitoring stations on INEEL	4-26
4-7	Offsite environmental dosimeter and foodstuff sampling locations	4-31
4-8	Surface water features of the Mud Lake-Lost River Basin	4-41
4-9	U.S. Geological Survey 100-year flood plain on the INEEL	4-43
4-10	U.S. Bureau of Reclamation 100-year flood plain on the INEEL	4-45
4-11	U.S. Bureau of Reclamation 500-year flood plain on the INEEL	4-46
4-12	Aquifers of Idaho.....	4-48
4-13	Distribution of tritium in Snake River Plain Aquifer on the Idaho National Engineering and Environmental Laboratory (1990-1992).....	4-55
4-14	Distribution of strontium-90 in Snake River Plain Aquifer on the Idaho National Engineering and Environmental Laboratory	4-56
4-15	Distribution of iodine-129 in Snake River Plain Aquifer on the Idaho National Engineering and Environmental Laboratory (1990-1991).....	4-57
4-16	Vegetation at the Idaho National Engineering and Environmental Laboratory	4-59

LIST OF FIGURES

(continued)

<u>Figure</u>			<u>Page</u>
4-17 Approximate location of wildfires at the Idaho National Engineering and Environmental Laboratory.....	.....	.....	4-60
4-18 Regional roadway infrastructure in southeastern Idaho .....	.....	.....	4-65
4-19 Typical A-Weighted Sound Levels .....	.....	.....	4-70
4-20 Minority population distribution within 50 miles of INTEC.....	.....	.....	4-76
4-21 Low-income population distribution within 50 miles of INTEC .....	.....	.....	4-77
5.2-1 Total projected direct employment by alternative compared to projected baseline employment at INTEC.....	.....	.....	5-9
5.2-2 Comparison of air pathway doses by alternative .....	.....	.....	5-27
5.2-3 Comparison of criteria air pollutant impacts by alternative .....	.....	.....	5-32
5.2-4 Comparison of toxic air impacts by alternative .....	.....	.....	5-36
5.2-5 Illustration of receptor rings in CALPUFF analyses .....	.....	.....	5-38
5.3-1 Comparison of air pathway doses for dispositioning facilities associated with waste processing alternatives.....	.....	.....	5-138
5.3-2 Comparison of criteria air pollutant impacts for disposition of facilities associated with waste processing alternatives .....	.....	.....	5-140
5.3-3 Toxic air pollutants impacts for disposition of facilities associated with waste processing alternatives.....	.....	.....	5-144
5.3-4 Air pathway doses by Tank Farm and bin set closure option .....	.....	.....	5-148
5.3-5 Criteria air pollutant impacts by Tank Farm and bin set closure alternative .....	.....	.....	5-149
5.3-6 Toxic air pollutant impacts for Tank Farm and bin set closure options .....	.....	.....	5-153
5.3-7 Air pathway doses for disposition of existing INTEC facilities associated with HLW management.....	.....	.....	5-154
5.3-8 Comparison of criteria air pollutant impacts for disposition of existing INTEC facilities associated with HLW management.....	.....	.....	5-155
5.3-9 Comparison of toxic air impacts for disposition of existing INTEC facilities .....	.....	.....	5-159
5.3-10 Impact assessment methodology for hypothetical disposition accidents in INTEC facilities.....	.....	.....	5-200
5.4-1 Cumulative generation of low-level waste at INEEL, 1995-2050.....	.....	.....	5-229
5.4-2 Cumulative generation of mixed low-level waste at INEEL, 1995-2050.....	.....	.....	5-229
5.4-3 Cumulative generation of hazardous waste at INEEL, 1995-2050 .....	.....	.....	5-230
5.4-4 Cumulative generation of industrial waste at INEEL, 1995-2050.....	.....	.....	5-230